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(54) Chewing gum

(57) The invention relates to a biodegradable chewing gum comprising one or more conventional chewing gum components and as gum base at least one biodegradable polymer selected from the group of polyesters and polycarbonates.

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Description

The invention relates to a new chewing gum formulation which has improved properties with regard to degradability.

It is known that chewing gum can give rise to a certain extent of environmental pollution inasmuch as it is very difficult to remove, if it can be removed at all, after use. It has already been proposed to replace a number of components of the chewing gum by components that are either taken up by the user during chewing or have a less poor biodegradability than the components conventionally used. EP-A 566,174, for example, discloses the use of a conventional elastomer in combination with a wholly or partly hardened oil. It is true that in the use of this formulation the poorly degradable paraffin can be replaced by another component, but the problems involved in the use of conventional, often synthetic elastomers remain.

The present invention is based on the surprising insight that it is possible to replace the conventional, non-degradable elastomers that are used in the gum base of chewing gum by biodegradable polymers. In combination with other biodegradable additives, a chewing gum is thus obtained whose organic components are biodegradable after use.

Accordingly, the invention primarily relates to a biodegradable chewing gum comprising as gum base at least one biodegradable polymer selected from the group of polyesters and polycarbonates. More particularly, the invention relates to a biodegradable, i.e. degradable in the environment, chewing gum comprising one or more conventional chewing gum components and, included in the gum base, at least one polymer having a glass transition temperature of 37°C at a maximum, which polymer contains chemically unstable compounds in the polymer chain.

Such chemically unstable compounds are preferably broken down under the influence of light or hydrolytically into components that are preferably water-soluble and non-toxic.

According to a preferred embodiment of the invention, the biodegradable chewing gum comprises one or more conventional chewing gum components and as gum base at least one polyester having a glass transition temperature of 37°C at a maximum. Such a polyester is more particularly based on the polymerisation product of one or more cyclic esters, such as lactide, glycolide, trimethylene carbonate, δ-valerolactone, β-propiolactone and ε-caprolactone. Such polyesters can for instance be used in the form of block copolymers or as mixtures of two or more homo- and/or copolymers.

It is preferred to use a gum base which is based on a copolymer or a block or graft copolymer of a lactide and one or more other cyclic esters, such as glycolide, trimethylene carbonate, δ-valerolactone, β-propiolactone and ε-caprolactone, or a mixture of two or more polymers, with at least one of the polymers containing lactide. In this preferred embodiment, it is preferred to use systems which contain at least 50% by weight of lactide units, more particularly at least 80%, based on the total of the polymers.

The preparation of such polymers for use as gum base can be effected in conventional manner, for instance by ring-opening polymerisation in the presence of suitable catalysts. These catalysts can be based on compounds of transition metals, which are preferred to have the GRAS status (generally recognised as safe).

Surprisingly, it has been found that with such biodegradable polymers a chewing gum can be obtained which has a structure and chewing characteristics comparable to those of chewing gum based on conventional, non-degradable elastomers. It has moreover been found that the adhesion of such a chewing gum to other materials, and more particularly to stone and smooth surfaces, is comparatively slight. This means that such a chewing gum can be removed from stones and the like with much less effort.

Optionally, the chewing gum according to the invention contains, in addition to the biodegradable elastomer component already described, one or more other biodegradable gum base components, together forming a water-insoluble, chewable gum base. Further, the chewing gum generally contains a water-soluble part and a water-insoluble flavour component. These last two components are generally taken up in the mouth during chewing, with the water-insoluble flavour component diffusing from the gum base along with the water-soluble component.

The suitable supplementary gum base components are, for instance, the components described in the above-mentioned European patent application 566,174, such as a fully hardened stearine fraction. The gum base can moreover contain yet other, biodegradable components, such as emulsifiers and gum base solvents. Suitable as emulsifiers are, for instance, lecithin and fatty acid monoglycerides, diglycerides and triglycerides.

The gum base may further include fillers, such as calcium carbonate, magnesium carbonate, talc, tricalcium phosphate and the like, as well as mixtures thereof. The amount of filler is generally 10 to 15% of the gum base. If desired, the gum base can also contain antioxidants, which must naturally be food-approved. Suitable antioxidants include butylhydroxide anisol and butylhydroxide toluene. Suitable amounts of antioxidant are between 0.01 and 0.1% by weight, based on the gum base.

The water-soluble component of the chewing gum, which is preferably 5 to 95% of the chewing gum and more particularly 10 to 50% by weight, comprises, for instance, plasticiser, sweeteners and combinations thereof. The plasticisers, or softeners, are added to the chewing gum in order to improve the chewability and mouthfeel of the gum. Plasticizers or softeners generally account for 0.5 to 15% by weight of the chewing gum. Examples are glycerin, lecithin and combinations thereof. The water-soluble component also contains, for instance, sorbitol, hydrogenated starch hydrolysates,

cane sugar syrup and combinations thereof, as well as saccharide containing components conventionally used in chewing gum, *inter alia* sucrose, dextrose, maltose, dextrin, dried invert sugar, fructose, levulose, galactose, and the like, alone or in combination. Sugar-free sweeteners comprise components that contain sweetening characteristics but are free of the known sugars, and comprise, for instance, sugar alcohols, such as sorbitol, mannitol, xylitol, hydrogenated starch hydrolysates, maltitol, as well as the known sweeteners aspartame, sucrose, acesulfame and saccharide, either alone or in combination.

The chewing gum can further contain an amount of flavouring agent, which is preferably between 0.1% and 10% by weight of the chewing gum. Suitable flavouring agents are generally the known food approved flavours, such as oils of plants and fruits, such as citrus oil, fruit extracts, peppermint oil, clove oil, aniseed oil and the like. It is also possible to add artificial flavour.

Additional ingredients, such as colouring agents and medicinal components, as well as mouth conditioners, can also be added to the chewing gum.

Generally, the chewing gum according to the invention is manufactured by successively adding the various chewing gum ingredients to a suitable mixer. After the ingredients have been thoroughly mixed, the mixture is discharged from the mixer and brought into the desired form, for instance by rolling and slicing, extruding or pelleting. In general, the ingredients are first mixed by melting the gum base which is added to a rotating mixer. The base can also be melted in the mixer itself. Colouring agents are preferably added at this time. A plasticiser is then brought into the mixer together with the sweetener and a part of the filler. The optional further required components can be added next. After mixing has been completed, the chewing gum is taken from the mixer and brought into the desired form.

The invention will now be elucidated in and by the following examples.

EXAMPLE 1

An amorphous, non-crystallizable copolymer of 80 mol.% L-lactide and 20 mol.% D-lactide was prepared by ring-opening polymerisation in the melt, in the presence of 0.1% by weight tin octoate as catalyst. To this polymer was added an amount of 20% by weight of ε-caprolactone, whereafter, under nitrogen and with continuous mechanical stirring, the mixture was heated to 150°C. To the homogeneous mixture, again 0.1% by weight tin octoate as catalyst was added, whereafter the polymerisation was completed.

The obtained polymer had a glass transition temperature (DSC, heating rate 10°C/min) of 15°. During chewing the polymeric material provided a chew feel strongly resembling that of conventional chewing gum. The degradation products of this copolymer are L-lactic acid, D-lactic acid and ω-hydroxyhexanoic acid, all non-toxic and water-soluble compounds.

On the basis of this polymer, a chewing gum was prepared using conventional additions and methods.

EXAMPLE 2

On the basis of the copolymer of Example 1 as gum base, a number of types of chewing gum having the following compositions are prepared.

- 64% by weight sugars and sweeteners (sorbitol, xylitol and saccharine), 1% by weight aroma and 35% by weight gum base, and emulsifier.
- 40% by weight sugar, 2% by weight aroma and 58% by weight gum base, and emulsifier.
- 35% by weight sugar, 3% by weight aroma and 62% by weight gum base, and emulsifier.

EXAMPLE 3

An amorphous, non-crystallizable copolymer of 25 mol.% L-lactide, 25 mol.% D-lactide and 50 mol.% ε-caprolactone was prepared by ring-opening polymerisation in the melt, in the presence of 0.1% by weight tin octoate as catalyst.

The obtained polymer has a glass transition temperature (DSC, heating rate 10°C/min) of -10°C.

To the polymer formed, under nitrogen, 40% by weight of sorbitol and an effective amount of emulsifier were added and mechanically mixed. During chewing the polymeric material provided a chew feel strongly resembling that of a conventional chewing gum.

EXAMPLE 4

Example 3 was repeated, except that instead of sorbitol 20% by weight of glycerol was added.

Claims

1. A biodegradable chewing gum comprising one or more conventional chewing gum components and as gum base at least one biodegradable polymer selected from the group of polyesters and polycarbonates.

2. A biodegradable chewing gum comprising one or more conventional chewing gum components and as gum base at least one polymer having a glass transition temperature of at most 37°C, which polymer contains chemically unstable compounds in the polymer chain.

3. A chewing gum according to claim 2, wherein said unstable compounds can be broken under the influence of light.

4. A chewing gum according to claim 2 or 3, wherein said unstable compounds can be broken hydrolytically.

5. A biodegradable chewing gum comprising one or more conventional chewing gum components and as gum base at least one polyester having a glass transition temperature of at most 37°C.

6. A chewing gum according to claim 5, wherein the polyester is based on one or more cyclic esters, such as lactide, glycolide, TMC and ε-caprolactone.

7. A chewing gum according to claim 6, wherein the polyester is a copolymer of lactide and ε-caprolactone.

8. A chewing gum according to claims 5-7, wherein the polyester is a block copolymer of lactide and ε-caprolactone, or a mixture of a polymer of lactide and a polymer of ε-caprolactone.

9. A chewing gum according to claims 1-8, wherein as additives one or more components are present, selected from the group consisting of fillers, antioxidants, plasticizers, sweeteners, flavouring substances, colouring substances, medicinal components and mouth conditioners.

10. A chewing gum according to claims 1-9, wherein the gum base is present in an amount of 5 to 95% by weight, while further 5-95% by weight additives are present.

11. A chewing gum according to claims 1-10, wherein further medicinal and/or mouth conditioning components are present.

12. Use of at least one biodegradable polymer selected from the group of polyesters and polycarbonates, as gum base of chewing gum.

13. The use according to claim 12, wherein the polymer contains chemically unstable compounds in the polymer chain and has a glass transition temperature of at most 37°C.

PATENTS SUMMARY

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Title:

CHEWING GUM

Desc.:

A biodegradable chewing gum containing a gum base made with at least one biodegradable polymer selected from polyesters and polycarbonates is claimed. The polymers have glass transition temperatures of at most 37 degrees C and contain chemically unstable compounds in the polymer chain. The unstable compounds are broken down by light and hydrolytically into water-soluble and non-toxic components. The chewing gum has only slight adhesion to smooth surfaces and is easily removed.

Key Words:

10 CHEWING GUM
17 Sugarless (Gum)
26 Sugar (Gum)
350 GUM BASE
353 Synthetic Rubbers
487 Polymers
502 Base Manufacture/Preparation
504 Mixing/Gum Manufacture
530 Chewing Gum Removal
576 Non-sticking
582 Biodegradable
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(54) New gum base, a method for preparing and chewing gum containing same.

(57) A gum base is provided having film-forming properties and thus is particularly suited for use in a bubble gum. The gum base contains 50 to 80% ester gums, and a unique fatty acid or fatty acid ester plasticizer, such as glycerol monooleate, and is free of conventional fillers. A bubble gum containing such gum base is also provided as well as a method for preparing same.

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Croydon Printing Company Ltd

NEW GUM BASE A METHOD FOR PREPARING AND CHEWING GUM CONTAINING SAME

The present invention relates to a novel chewing gum base containing high levels of ester gums, no fillers and a unique plasticizing agent which imparts superior film-forming properties to the gum base, making it especially suited as a bubble gum base. The present invention also relates to chewing gum containing such gum base and to a method for preparing same.

Chewing gums available today generally contain a natural rubber gum base, a synthetic rubber gum base or a mixture of natural and synthetic rubber gum bases. In the case of synthetic rubber gum bases, the elastomer usually employed is styrene-butadiene copolymer which is plasticized with glycerol esters of rosin. If a conventional bubble gum base is desired, 25-40% ester gum is usually used as the film-former. Also, appreciable levels of filler, e.g., calcium carbonate, talc, are used to assist in film-forming. Lecithin has also been used in the gum or gum base to soften the extremely firm chew imparted by the use of the ester gums in the gum base. The ester gums, lecithin or other softeners, such as, glycerol monostearate used at required levels to soften the gum base tend to destroy the natural film-forming properties making it undesirable for use as a bubble gum base.

In accordance with the present invention, a gum base is provided which contains substantial amounts of ester gums yet has highly superior film-forming properties and thus has superior bubble-blowing character, is substantially less tacky than prior art ester gum containing chewing gums and remains soft for prolonged periods. In addition, the gum base of the invention contains no filler and thus may contain mint as well as acid or fruit flavors. The present invention provides a gum base composed of an elastomer, ester gums and plasticizer wherein the ester gums are present in an amount of from about 50 to about 85% by weight and the plasticizer is a fatty acid, esters of a fatty acid or mixtures thereof, the gum base being substantially free of inorganic fillers.

Thus, the gum base of the invention will generally comprise one or more natural and/or synthetic elastomers in an amount within the range of from about 0.5 to about 25%, and preferably from about 4 to about 15% by weight of the gum base, ester gum resin in an amount within the range of from about 50 to about 85%, and preferably from about 60 to about 80% by weight of the gum base, plasticizing agent in an amount within the range of from about 1 to about 25%, and preferably from about 5 to about 20% by weight of the gum base, together with softeners in an amount within the range of from about 0 to about 10%, and preferably from about 2 to about 8% by weight of the gum base, and waxes in an amount within the range of from about 1 to about 20%, and preferably from about 3 to about 16% by weight of the gum base.

The unique plasticizing agent which may be employed in the gum base of the invention includes fatty acids, such as oleic acid, lauric acid, lactic acid, isostearic acid, caprylic acid, capric acid or stripped coco; glycerol esters of fatty acids such as mono-, di- or triglycerol esters of any of the fatty acids listed above, with glycerol monooleate being preferred; polyglycerol esters of fatty acids such as any of those listed above, having a hydrophilic/hydrophobic character of HLB 2 to 13; or sorbitan or polysorbate esters of fatty acids such as any of those listed above.

Another of the unique features of the gum base of the invention is the use of the extraordinarily large amounts of ester gums (normally a tackifier) yet the amount of tack in the gum base is less than conventional ester gum type base which contains 25 to 40% ester gum. It is believed that the reduced tackiness in the gum base of the invention is attributed to the maintenance of an ester gum to elastomer weight ratio of from about 5:1 to about 8:1 whereas, in conventional ester gum containing gum base, such ratio is maintained at or below 4:1. The ester gums which may be employed in the gum base of the invention include any of those normally employed in conventional gum base such as hydrogenated ester gum, that is glycerol ester of hydrogenated rosin and/or dimerized ester gum, pentaerythritol ester gum, polymerized ester gum, or ester gum.

In preferred embodiments, the gum base of the invention will contain one or more waxes which serve as texture modifiers and should have a melting point of above about 35°C. The waxes will be present in an amount within the range of from about 1 to about 20%, and preferably from about 3 to about 16% based on the weight of the gum base. Examples of such waxes include paraffin wax, microcrystalline wax, carnauba wax, ozokerite wax, oricury wax and the like. Preferred waxes are microcrystalline wax, and paraffin wax employed in combination so that from about 0 to about 15% (based on the weight of the gum base) of the microcrystalline wax is employed with from about 0 to about 15% (based on the weight of the gum base) of the paraffin wax. The waxes are found to reduce the tackiness of the final gum composition without significantly reducing cohesivity thereof.

The gum base of the invention may, but will preferably, contain additional softeners, emulsifiers, and/or lubricants, such as one or more hydrogenated vegetable or animal fats having a melting point above 22°C, in an amount within the range of from about 0 to about 10% and preferably from about 0.5 to about 7% by weight of the gum base. Examples of such softeners include, but are not limited to, glycerol monostearate, lecithin, coconut oil, fatty acids such as stearic acid, or palmitic acid, paritally hydrolyzed polyvinyl esters, or mono-, di- and triglycerol esters of fatty acids as described above.

The elastomers which may be present in the gum base of the invention include styrene-butadiene copolymer, isobutylene-isoprene copolymer, polyisobutylene, natural rubber (polyisoprene) as well as other masticatory substances of natural origin, such as rubber latex solids, chicle, crown gum, nispero, rosidinha, jelutong, pendare, perillo, niger gutta, tunu, etc. The elastomer or masticatory substance will be employed in an amount within the range of from about 0.5 to about 25%, preferably from about 4 to about 15% by weight of the gum base.

The following represents preferred gum base formulations in accordance with the present invention.

Ingredient	% by Weight
Elastomer (preferred is styrene-butadiene copolymer (24% bound styrene) and/or (48% bound styrene)	4 to 15
Ester gum	60 to 80
Plasticizer (preferably glycerol monooleate)	5 to 20
Waxes (preferably microcrystalline wax and/or paraffin wax)	5 to 15
Softeners (preferably glycerol monostearate)	0 to 10

It has been found that in accordance with the teachings of the present invention, the use of glycerol esters of fatty acids, preferably oleic acid, enhances rather than reduces the film-forming properties of a bubble gum.

It has also been found that where glycerol monooleate is employed as the unique plasticizing agent, an excellent bubble gum base and bubble gum are produced. Glycerol monooleate has been found to be a superior film-forming plasticizing agent for ester gum, far and away better than glycerol monostearate or other conventional gum additives. The film-forming capability of glycerol monooleate increases as its weight percent in the gum base formula increases. Thus, improved bubble blowing capacity is obtained with the use of increasing amounts of glycerol monooleate. In addition, bubble blowing capability is maintained even though the gum base of the invention does not contain conventional fillers, such as calcium carbonate or talc.

The gum base of the invention as described above may be formed by simply mixing the various ingredients thereof until a homogeneous mixture is obtained.

The gum base of the invention may be employed in forming a chewing gum, especially a bubble gum, and in such case the gum base will be present in an amount of within the range of from about 10 to about 40% and preferably from about 15 to about 30% by weight of the chewing gum.

The chewing gum of the invention may be of the sugar-containing or sugarless variety. Examples of sweeteners which may be employed include sugars, for example, monosaccharides of 5 or 6 carbon atoms, such as arabinose, xylose, ribose, glucose, mannose, galactose, fructose, dextrose, or sorbose or mixtures of two or more of the foregoing monosaccharides; disaccharides, for example, sucrose, such as cane or beet sugar, lactose, maltose or cellobiose; polysaccharides, such as partially hydrolyzed starch or dextrin, as well as sugar alcohols, such as sorbitol, mannitol, xylitol, or mixtures thereof, as well as hydrogenated starch hydrolysates or isomaltitol, and mixtures of two or more of the above sugars and/or sugar alcohols.

Any of the above sugars may be present in an amount of within the range of from about 0.05 to about 90% and preferably from about 40 to about 85% by weight of the chewing gum. The sugar alcohols, where present, will be employed in an amount of from about 0.05 to about 90% and preferably from about 40 to about 85% by weight of the chewing gum.

The chewing gum of the invention may also contain in lieu of or in addition to any of the above sugars or sugar alcohols an artificial sweetener, such as, for example, aspartame, cyclamate, or a saccharin or other sweetener as set out hereinafter, the artificial sweetener being present in an amount of from 0 to about 1.5% by weight, and preferably, from about 0.05 to about 0.3% by weight of the chewing gum.

Examples of artificial sweeteners which may be employed herein include sodium, calcium or ammonium saccharin salts, dihydrochalcones, glycyrrhizin, dipotassium glycyrrhizin, glycyrrhizic acid ammonium salt, L-aspartyl-L-phenylalanine methyl ester (aspartame), the sodium, ammonium or calcium salt of 3,4-dihydro-6-methyl-1,2,3-oxathiazine-4-one-2,2-dioxide, the potassium salt of 3,4-dihydro-6-methyl-1,2,3-oxathiazine-4-one-2,2-dioxide (Ace-sulfame-K), as well as Stevia rebaudiana (Stevioside), Richardella dulcifica (Miracle Berry), Dioscoreophyllum cumminsii (Serendipity Berry), cyclamate salts, and the like, or mixtures of any two or more of the above.

The chewing gum of the invention may include flavoring, such as sour or fruit flavoring or non-acid or mint flavoring in an amount ranging from about 0.5 to about 2% by weight of the final chewing gum product. The flavoring may comprise synthetic flavors and oils derived from plants, leaves, flowers, fruit, etc. Representative fruit flavor adjuncts include acids, such as adipic, citric, malic, succinic and fumaric acid, and citrus oils, such as lemon oil, orange oil, lime oil, grapefruit oil, and fruit essences, such as apple essence, pear essence, peach essence, strawberry essence, apricot essence, raspberry essence, cherry essence, plum essence, pineapple essence, as well as the following essential oils: peppermint oil, spearmint oil,

mixtures of peppermint oil and spearmint oil, clove oil, bay oil, anise oil, eucalyptus oil, thyme oil, cedar leaf oil, cinnamon oil, oil of nutmeg, oil of sage, oil of bitter almonds, cassia oil, and methylsalicylate (oil of wintergreen). Various synthetic flavors, such as mixed fruit, may also be incorporated in the chewable gum base with or without conventional preservatives.

The above-described chewing gums containing the unique gum base of the invention may be prepared employing conventional processing techniques.

The following Examples represent preferred embodiments of the present invention.

Example 1

A bubble gum base of the following formulation was prepared as described below.

Gum Base Ingredients	% by Weight
Styrene-butadiene elastomer	
a) 24% bound styrene	3
b) 48% bound styrene	7
Ester gum (glycerol ester of modified rosin)	10
Ester gum (glycerol ester of hydrogenated rosin)	60
Glycerol monooleate	3
Glycerol monostearate	2
Triglyceride	2
Paraffin wax	6
Microcrystalline wax	7
	100%

The elastomer and ester gums were mixed in a sigma blade mixer until homogeneous. Thereafter, the waxes were added with mixing followed by the remaining ingredients. Mixing was continued until a homogeneous mass was obtained.

The above gum base of the invention chews well, has reduced tackiness and has good bubble-blowing properties.

In addition, since it is free of $CaCO_3$, the gum base may be used with acid flavors and/or acid sweeteners such as aspartame and free acid form of saccharin. Also, the addition of 70% ester gum surprisingly does not adversely affect the abhesive properties of the base, and, in fact, makes the base less tacky.

Example 2

A bubble gum base of the following formulation was prepared as described below.

Gum Base Ingredient	% by Weight
Styrene-butadiene elastomer (30:70 mix of 24% bound styrene and 48% bound styrene material)	10
Ester gum	10
Ester gum	62
Glycerol monooleate	5
Microcrystalline wax	7
Paraffin wax	6

The elastomer and ester gums were mixed in a sigma blade mixer until homogeneous. Thereafter, the waxes were added with mixing followed by the glycerol monooleate. Mixing was continued until a homogeneous mass was obtained.

The above gum base of the invention chews well, has reduced tackiness and has very good bubble-blowing properties.

In addition, since it is free of $CaCO_3$, the gum base may be used with acid flavors and/or acid sweeteners such as aspartame and free acid form of saccharin. Also, the addition of 72% ester gum surprisingly does not adversely affect the abhesive properties of the base, and, in fact, makes the base less tacky.

Example 3

A bubble gum base of the following formulation was prepared as described in Example 2.

Gum Base Ingredient	% by Weight
Styrene-butadiene elastomer (30:70 of 24% and 48% bound styrene)	10
Ester gum	10
Ester gum	60
Glycerol monooleate	10
Microcrystalline wax	5
Paraffin wax	5

The above gum base of the invention chews well, has reduced tackiness and has excellent bubble-blowing properties.

In addition, since it is free of $CaCO_3$, the gum base may be used with acid flavors and/or acid sweeteners such as aspartame and free acid form of saccharin. Also, the addition of 70% ester gum surprisingly does not adversely affect the abhesive properties of the base, and, in fact, makes the base less tacky.

In a control run, to demonstrate the superiority of glycerol monooleate over glycerol monostearate in increasing film-forming capability of ester gum, the following was prepared as described in Example 2, except that glycerol monostearate was used in place of glycerol monooleate.

Control Run A

Gum Base Ingredient	% by Weight
Styrene-butadiene elastomer (30:70 mix of 24% and 48% bound styrene)	10
Ester gum	10
Ester gum	60
Glycerol monostearate	10
Microcrystalline wax	5
Paraffin wax	5

The gum base so-prepared is found to be a poor bubble gum, with poor bubble blowing capability, thereby clearly evidencing superiorty of glycerol monooleate over glycerol monostearate.

Example 4

A bubble gum base of the following formulation was prepared as described in Example 2.

Gum Base Ingredient	% by Weight
Styrene-butadiene elastomer (30:70 mix of 24% and 48% bound styrene)	10
Ester gum	10
Ester gum	60
Glycerol monooleate	15
Microcrystalline wax	5

The above gum base of the invention chews well, has reduced tackiness, and has excellent bubble-blowing properties. The gum base is initially very soft and remains soft over extended periods covering several weeks.

In addition, since it is free of $CaCO_3$, the gum base may be used with acid flavors and/or acid sweeteners such as aspartame and free acid form of saccharin. Also, the addition of 70% ester gum surprisingly does not adversely affect the abhesive properties of the base, and, in fact, makes the base less tacky.

Example 5

A bubble gum base of the following formulation was prepared as described in Example 2.

Gum Base Ingredient	% by Weight
Styrene-butadiene elastomer (48% bound styrene)	10
Ester gum	10
Ester gum	65
Oleic acid	10
Microcrystalline wax	5

The above gum base of the invention chews well, has reduced tackiness, and has very good bubble-blowing properties. The gum base is initially very soft and remains soft over extended periods covering several weeks.

In addition, since it is free of $CaCO_3$, the gum base may be used with acid flavors and/or acid sweeteners such as aspartame and free acid form of saccharin. Also, the addition of 75% ester gum surprisingly does not adversely affect the abhesive properties of the base, and, in fact, makes the base less tacky.

Example 6

A bubble gum base of the following formulation was prepared as described in Example 2.

Gum Base Ingredient	% by Weight
Styrene-butadiene elastomer (48% bound styrene)	10
Ester gum	10
Ester gum	65
Polyglycerol ester of oleic acid	10
Microcrystalline wax	5

The above gum base of the invention chews well, has reduced tackiness, and has excellent bubble-blowing properties. The gum base is initially very soft and remains soft over extended periods covering several weeks.

In addition, since it is free of $CaCO_3$, the gum base may be used with acid flavors and/or acid sweeteners such as aspartame and free acid form of saccharin. Also, the addition of 75% ester gum surprisingly does not adversely affect the abhesive properties of the base, and, in fact, makes the base less tacky.

Example 7

A bubble gum base of the following formulation was prepared as described in Example 2.

Gum Base Ingredient	% by Weight
Styrene-butadiene elastomer (48% bound styrene)	10
Ester gum	10
Ester gum	65
Tween 85	10
Microcrystalline wax	5

The above gum base of the invention chews well, has reduced tackiness, and has good bubble-blowing properties. The gum base is initially very soft and remains soft over extended periods covering several weeks.

In addition, since it is free of $CaCO_3$, the gum base may be used with acid flavors and/or acid sweeteners such as aspartame and free acid form of saccharin. Also, the addition of 75% ester gum surprisingly does not adversely affect the abhesive properties of the base, and, in fact, makes the base less tacky.

In a control run to further demonstrate the superiority of glycerol monooleate over glycerol monostearate in increasing film-forming capability of ester gum, the following gum base was prepared as described in Control Run A.

Control Run B

Gum Base Ingredient	% by Weight
Styrene-butadiene elastomer (30:70 mix of 24% and 48% bound styrene)	10
Ester gum	10
Ester gum	60
Glycerol monostearate	15
Microcrystalline wax	5

The gum base produced is found to be initially hard and gets harder on standing, and is very difficult to blow bubbles with. Thus, it is again seen that glycerol monostearate is not an effective film-forming agent for ester gums.

Example 8

A bubble gum having the following composition was prepared as described below:

Ingredient	% by Weight of the Chewing Gum
Gum base (as described in Ex. 1)	22
Sugar pulverized	52
Corn syrup 43° Be	23
Softeners	1.5
Flavor	1.0
Color	0.05

The gum base was melted (temperature 121°C) and placed in a standard dough mixer kettle equipped with sigma blades and cooled to 82°C . The corn syrup, softeners and color were added with mixing over a 5 minute period, thereafter the pulverized sugar and flavors were added according to conventional chewing gum practice and mixed for 5 minutes. The gum was discharged from the kettle and was rolled or extruded and cut into sticks or cubes.

The resulting chewing gum product is found to have a good chew and has improved bubble blowing properties.

Example 9

A bubble gum having the following composition was prepared as described below:

Ingredient	% by Weight of the Chewing Gum
Gum base (as described in Ex. 2)	24
Sugar pulverized	61
Corn syrup, high fructose	14
Flavor	1

The gum base was melted (temperature 121°C) and placed in a standard dough mixer kettle equipped with sigma blades and cooled to 82°C. The corn syrup was added with mixing over a 5 minute period thereafter the pulverized sugar and flavors were added according to conventional chewing gum practice and mixed for 5 minutes. The gum was discharged from the kettle and was rolled or extruded and cut into sticks or cubes.

The resulting chewing gum product is found to have a good chew and has very good bubble blowing properties.

Example 10

A sugarless bubble gum in accordance with the present invention and having the following composition was prepared as described below:

Ingredient	% by Weight of the Chewing Gum
Gum base (as described in Ex. 3)	24
Sorbitol	49.4
Mannitol	5.5
Sorbitol solution	19.5
Flavor	1.5
Sodium saccharin	0.1

The gum base was melted (temperature 121°C) and placed in a standard dough mixer kettle equipped with sigma blades and cooled to 82°C . The mannitol and sorbitol powder were added with mixing over a 5 minute period; thereafter the flavor, sorbitol solution and sodium saccharin were added according to conventional chewing gum practice and mixed for 5 minutes. The gum was discharged from the kettle and was rolled or extruded and cut into sticks or cubes.

The resulting chewing gum product is found to have a good chew, a pleasant sweet taste and has excellent bubble blowing properties.

Example 11

A sugarless bubble gum in accordance with the present invention and having the following composition was prepared as described below:

Ingredient	% by Weight of the Chewing Gum
Gum base (as described in Ex. 4)	24
Sorbitol powder	63.5
Mannitol	5
Flavor	1.5
Water	6

The gum base was melted (temperature 121°C) and placed in a standard dough mixer kettle equipped with sigma blades and cooled to 82°C. The powdered sorbitol and mannitol were added with mixing over a 5 minute period; thereafter the flavor and water were added according to conventional chewing gum practice and mixed for 5 minutes. The gum was discharged from the kettle and was rolled or extruded and cut into sticks or cubes.

The resulting chewing gum product is found to have a good chew and has excellent bubble blowing properties and reduced tackiness.

Example 12

A bubble gum having the following composition was prepared as described below:

Ingredient	% by Weight of the Chewing Gum
Gum base (as described in Ex. 5)	24
Sugar pulverized	52
Corn syrup 43° Be	21
Softeners	1.95
Flavor	1
Color	0.05

The gum base was melted (temperature 121°C) and placed in a standard dough mixer kettle equipped with sigma blades and cooled to 82°C. The corn syrup, softeners and color were added with mixing over a 5 minute period; thereafter the pulverized sugar and flavors were added according to conventional chewing gum practice and mixed for 5 minutes. The gum was discharged from the kettle and was rolled or extruded and cut into sticks or cubes.

The resulting chewing gum product is found to have a good chew and has very good bubble blowing properties.

Example 13

A bubble gum having the following composition was prepared as described below:

Ingredient	% by Weight of the Chewing Gum
Gum base (as described in Ex. 6)	22
Sugar pulverized	52.5
Corn syrup 43° Be	22
Softeners	0.75
Flavor	1.2
Color	0.05
Citric acid	1.5

The gum base was melted (temperature 121°C) and placed in a standard dough mixer kettle equipped with sigma blades and cooled to 82°C. The corn syrup, softeners and color were added with mixing over a 5 minute period; thereafter the pulverized sugar and flavors were added according to conventional chewing gum practice and mixed for 5 minutes. The gum was discharged from the kettle and was rolled or extruded and cut into sticks or cubes.

The resulting chewing gum product is found to have a good chew, tart flavor, has excellent bubble blowing properties, and exhibits reduced tackiness.

Example 14

A bubble gum having the following composition was prepared as described below:

Ingredient	% by Weight of the Chewing Gum.
Gum base (as described in Ex. 7)	22
Sugar pulverized	52.95
Corn syrup 43°Be	23
Softeners	1
Flavor	1
Color	0.05

The gum base was melted (temperature 121°C) and placed in a standard dough mixer kettle equipped with sigma blades and cooled to 82°C. The corn syrup, softeners and color were added with mixing over a 5 minute period; thereafter the pulverized sugar and flavors were added according to conventional chewing gum practice and mixed for 5 minutes. The gum was discharged from the kettle and was rolled or extruded and cut into sticks or cubes.

The resulting chewing gum product is found to have a good chew and has good bubble blowing properties.

CLAIMS:

1. A gum base having film-forming capability composed of an elastomer, ester gums, and plasticizer characterized in that the ester gums are present in an amount of from about 50 to about 85% by weight and the plasticizer is a fatty acid, esters of fatty acids or mixtures thereof, the gum base being substantially free of inorganic fillers.

2. The gum base as in Claim 1 wherein the plasticizer is present in an amount of from about 1 to about 25% by weight of the gum base.

3. The gum base as in Claims 1 or 2 wherein the plasticizer is a fatty acid, mono-, di- or triglycerol ester of a fatty acid, polyglycerol ester of a fatty acid having a hydrophobic/hydrophilic character of HLB 2 to 13, sorbitan or polysorbate ester of a fatty acid and is present in an amount of from about 5 to about 20% by weight of the gum base.

4. The gum base as in any of Claims 1-3 wherein the elastomer is a styrene-butadiene copolymer, polyisobutylene, isobutylene-isoprene copolymer, or natural rubber and is present in an amount of from about 0.5 to about 25% by weight of the gum base.

5. The gum base as in any of Claims 1-4 further including one or more waxes.

6. The gum base as in Claim 4 or 5 wherein the elastomer is a styrene-butadiene copolymer, the plasticizer is glycerol monooleate, and the wax is microcrystalline wax.

7. The gum base as in any of Claims 4-6 wherein the elastomer is present in an amount of from about 4 to about 15% by weight, the ester gum is present

in an amount of from about 60 to about 80% by weight, the plasticizer is present in an amount of about 5 to about 20% by weight and the wax is present in an amount of from about 5 to about 15% by weight of the gum base.

8. A chewing gum containing a gum base as defined in Claim 1.

9. The method of preparing a gum base having film-forming capability composed of an elastomer, ester gums and plasticizer characterized in that the elastomer and ester gums in an amount of from about 50 to about 85% by weight are thoroughly mixed together, adding a plasticizer thereto consisting of a fatty acid or an ester of a fatty acid or mixtures thereof and continuing the mixing for a sufficient length of time until a homogeneous mass is obtained.

10. The method as in Claim 9 wherein the plasticizer is present in an amount of from about 1 to about 25% by weight of the gum base.

11. The method as in Claims 9 or 10 wherein the plasticizer is a fatty acid, mono-, di- or triglycerol ester of a fatty acid, polyglycerol ester of a fatty acid having a hydrophobic/hydrophilic character of HLB 2 to 13, sorbitan or polysorbate ester of a fatty acid and is present in an amount of from about 5 to about 20% by weight of the gum base.

12. The method as in any of Claims 9-11 wherein the elastomer is a styrene-butadiene copolymer, polyisobutylene, isobutylene-isoprene copolymer or natural rubber and is present in an amount of from about 0.5 to about 25% by weight of the gum base.

13. The method as in any of Claims 9-12 further including one or more waxes.

14. The method as in Claims 12 or 13 wherein the elastomer is a styrene-butadiene copolymer, the plasticizer is glycerol monooleate and the wax is microcrystalline wax.

15. The method as in any of Claims 12-14 wherein the elastomer is present in an amount of from about 4 to about 15% by weight, the ester gum is present in an amount of from about 60 to about 80% by weight, the plasticizer is present in an amount of from about 5 to about 20% by weight and the wax is present in an amount of from about 5 to about 15% by weight of the gum base.

David Record
09/29/00 01:59 PM

To: Donald Seielstad/USA/Amer/Wrigley@Wrigley
cc:
Subject: RE: Meeting of 9/27/00

Don, I think this is yours.

Dave

----- Forwarded by David Record/USA/Amer/Wrigley on 09/29/00 01:57 PM -----

"Menadier, Bruce" <Bruce.Menadier@na.dragoco.com>
09/29/00 01:46 PM

To: DRecord@wrigley.com
cc: "Penichter, Karen" <Karen.Penichter@na.dragoco.com>
Subject: RE: Meeting of 9/27/00

Dave,
Thank you for kind comments. We appreciate the opportunity you have given Dragoco.

Could you please send us an appropriate blank base for testing long lasting fruit flavor systems?

Regards,
Bruce

-----Original Message-----
From: DRecord@wrigley.com [mailto:DRecord@wrigley.com]
Sent: Thursday, September 28, 2000 11:54 AM
To: bruce.menadier@na.dragoco.com
Subject: Meeting of 9/27/00

Helps if I spell your name w/o a typo.

Dave
----- Forwarded by David Record/USA/Amer/Wrigley on 09/28/00 11:52 AM -----

David Record
09/28/00 11:20 AM

To: bruce.menddier@na.dragoco.com
cc: rossella.mazzucchelli@na.dragoco.com, karen.penichter@na.dragoco.com, Philip Schnell/USA/Amer/Wrigley@Wrigley, James Maxwell/USA/Amer/Wrigley@Wrigley, Donald Seielstad/USA/Amer/Wrigley@Wrigley
Subject: Meeting of 9/27/00

Bruce,

Thank you for arranging the meeting we had yesterday. It was a pleasure and productive to meet with you, Karen and Rossella.

Rossella's presentation on Dragoco's 2nd party breath freshening agent was well done and provided an excellent beginning for us in demonstrating feasibility for this material. We look forward to getting a sample, and a few more details about the testing, as soon as possible. Dr. Maxwell will write you separately about that.

Thanks also for the bitterness masking samples using APAP. They showed promise and we will want to move quickly on this work of Mark Ipolito's by getting a sample and finding out more about how the technology works. Dr. Seielstad will write you separately about that.

Look forward to working with you on the above projects. Both have significant priority for us, so let's move quickly with therm.

Please call with any questions.

Regards,

Dave Record
773.650.5584